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ABSTRACT

This document contains the fall 1999, fall 2000, and winter 2000 issues of "Technology and Teacher Preparation." The fall 1999 issue describes NCREL and its Higher Education Initiative; contains a faculty profile focusing on engaging science educators with technology; and describes tenth-grade students' efforts to measure the Coon River creekbed, Minnesota. The fall 2000 issue offers articles on the following topics: the University of Illinois Chicago's program to place preservice teachers in city classrooms following training on the integration and use of technology in the classroom; tools and resources for systemic redesign (the enGauge Web-based framework and tool set, which is designed to help schools, districts, colleges, and universities use technology effectively for teaching and learning); providing professional development via the Pathways to School Improvement Internet server to promote the effective use of technology in education; integrating information and communication technologies into teacher education programs in the Netherlands and the United States; and a variety of World Wide Web sites containing resources and information about technology and teacher preparation. The winter 2000 articles are: (1) "Get with the Program: Online Teaching Is Here To Stay" (Raymond Rose); and (2) "Reforming Teacher Preparation for Effective Use of Learning Technologies" (Kyle L. Peck). (SM)

Technology and Teacher Preparation, 1999-2000

Sabrina Laine, Editor

Fall 1999
Fall 2000
Winter 2000

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NCREL

North Central Regional Educational Laboratory

"Applying Research and Technology to Learning"

Fall 1999

TECHNOLOGY AND TEACHER PREPARATION

IN THIS ISSUE

**Faculty Profile:
Engaging Science
Educators With
Technology**

**Technology in the
Classroom:
A Sample Lesson**

**Check Out These
Web Sites**

What Is NCREL?

North Central Regional Educational Laboratory (NCREL) is one of ten federally funded regional educational laboratories serving the needs of students and educators across the United States. NCREL specializes in technology integration and serves the upper-midwestern region of the country.

For over 10 years, NCREL has developed and delivered products and services for K-12 educators. For example, our *Pathways to School Improvement* Web site (www.ncrel.org/pathways.htm) receives over 1,200 visitors daily and our Learning With Technology course helps practicing teachers integrate technology into the curriculum in meaningful ways. We invite you to visit our Web site (www.ncrel.org) for more information on these and many other resources.

NCREL's Higher Education Initiative

Over the years, many preservice teacher educators have expressed interest in our efforts to help classroom teachers develop strategies for integrating technology into the curriculum. Spurred by this interest, NCREL has created a project called **Preparing Teachers for Tomorrow (PTT)**. The project's goal is to support education faculty as they explore new ways of preparing teachers for the 21st century.

Preparing Teachers for Tomorrow includes a Web site that highlights issues and best practices in the preparation of new teachers as well as this quarterly newsletter on technology applications in teacher preparation. Each issue of the newsletter will include the following features:

- **Faculty Profile**—a story about a preservice faculty member who has developed lessons that address technology integration
- **Technology in the Classroom: Sample Lessons**—interviews, sample lessons, and resources from K-12 classroom teachers who have enhanced a lesson or unit with technology
- **Web Sites**—reviews and abstracts of Web sites to help teacher educators locate resources, models, curricular ideas and materials, and sites for their students

COMING SOON

PTT Web site!

www.ncrel.org/ncrel/nc/ptt/

Faculty Profile

Engaging Science Educators with Technology

Course: Methods of Teaching Middle/Senior High School Science

Featured Faculty: Professor Hans Andersen, Indiana University, ANDERSEN@indiana.edu



Can helping students learn to teach with technology bring new life to an experienced teacher educator? Hans Andersen would answer a resounding "yes" and go on to explain how his course has been "professionalized" by the addition of technology. "My goal is to see if I can prepare my student teachers to use technology well enough to teach and help their classroom teachers (during their professional semester) with technology."

Modeling. Hans teaches his students "just the way I want them to teach in schools: everything gets modeled." Classes include demonstrations of Probeware, laserdiscs, CD-ROMs, and spreadsheets. "We also e-mail all assignments or turn them in on a disk. I return all comments electronically and allow for lots of revisions, since the computer makes that so easy."

"To show them classifying, I dump the contents of my desk drawer on a table and ask groups to organize what they see, to consider the things that are alike and different, and to invent a classifying system. Then, we can use the classroom computers to create spreadsheets and databases of what we have invented."

Hans wants students to experience cooperative learning as an extension of

his belief in modeling. He believes, as Piaget has expressed, that everything should be introduced only when it can be shown and practiced, not just presented and discussed.

World Wide Web. "The World Wide Web is loaded with both good and bad science materials. I show the bad as well as the good. Students take turns doing a Web site report each day. People have so much interest in this activity that they take extra turns and bring in Web sites we 'just have to' look at!"

Engaged Learning. Using technology regularly helps students see how science can be taught using the engaged learning model he introduces in class. "It used to be called 'inquiry teaching,' but I like the engaged learning principles better. Inquiry is often understood by my students as 'something scientists do,' rather than something they can model and teach. But the engaged learning model is meaningful. They can plan for student engagement and it is not intimidating to them." Students include levels of engagement, low to high, in the lesson plans they develop in class.

"I help them learn the engaged learning characteristics by using the 'Engaged Learning' essay from the Learning With Technology (LWT) course materials from NCREL. I also make extensive use of their videotapes and the CD-ROM materials. These provide the model of expected behavior that really visually explains what I am hoping for in my student teachers."

Constructive Friend. Hans also uses the LWT concept of the "constructive friend," in which colleagues review each

other's lesson plans and support the integration of technology into teaching. "The materials help students learn that collaboration with other teachers—and serving as a constructive friend for a peer—is an important part of teaching."

Standards. The units students develop in Hans' class for their student teaching must be based upon the Indiana Proficiencies, the National Science Teachers Association's benchmarks, or the Science Research Council Education Standards. Hans finds that requiring students to be familiar with the standards is easier now that they are available on the Web.

Technology Projects. Hans also requires students to present their unit ideas in class using PowerPoint presentations. "In the future, I would like to get students involved in creating Web pages to support their teaching ideas. I may have them create Web pages that are sites for their students and the parents, to help them understand what is taught in science. Producing a product will become more important to my class assignments, as we include Web page design and production. But project-based education will still be the focus. Keeping science students engaged in their learning is vital."

Hans credits the Educational Technology Services unit at Indiana University with reenergizing him as a professor by encouraging and helping him integrate technology. "ETS reports that 'even the dinosaurs' are using technology effectively to model good teaching. I feel that this has revived my teaching career."

Technology in the Classroom

Minnesota Students Measure the Coon River Creekbed¹

Welcome

to Coon Rapids High School in Coon Rapids, Minnesota, where Skip Rum-sch's tenth-grade biology class is investigating how the local creekbed affects the health and prosperity of the community. Skip believes that students should connect what they learn in the classroom to real-world problems. He also wants them to understand that local concerns may also be regional or even universal concerns. "I hope that the students ... get increased awareness of water quality issues, which are really serious in our country," explains Skip. He also wants them to have a better understanding of general ecology issues.

Luckily, Skip discovered the Rivers Project, designed and monitored by Southern Illinois University at Edwardsville. The River Project began in 1990 as a pilot program with eight schools along the Mississippi and lower Illinois Rivers. The project has now grown and includes schools in the United States and Canada.

Skip and his students work with students and teachers from other schools to analyze water quality from various test sites. Their river study includes the historical, social, and/or economic implications of river conditions.

Skip's students work in their own backyard—the Coon River watershed. They are investigating how river discharge, rate of flow, velocity of the current, and the contouring and meandering of the stream affect its habitat and the organisms that live in it. The students are dealing with issues such as the pH of the water, nitrogen, phosphorus, fecal coliform, invertebrate and plant life, dissolved oxygen, temperature, and total solvents.

What did this unit look like?

Skip's students started with a shoebox model of the topography of a riverbed. They inserted a wooden dowel into holes in the top of the model, measured

it, and entered the data into an electronic spreadsheet. They then entered the data into a public domain NIH* (National Institute of Health) program that created an electronic visual image of the riverbed. Once they understood what a riverbed might look like, they went to the field to do the imaging of the Coon River creekbed. The unit took approximately three weeks to complete with two days in the field measuring the creekbed and a smaller drainage ditch, and approximately three days' work with the technology. Students worked in groups of two to six, depending on the scope of the work, and shared responsibilities of gathering, reporting, and entering data. All students were responsible for data analysis.

How did technology support this unit in ways that traditional methods could not?

Traditional data-gathering methods, such as those used in testing oxygen or hydrogen, take a lot of class time. According to Skip, NIH imaging allows his students to measure the parameters of the creek more quickly and efficiently and to sample larger portions. And Skip would rather have his students spend their time on data analysis and on predicting the effects of Coon River's water quality on their community than on data collection.

What kinds of analysis did students do?

Since NIH imaging doesn't show output or discharge, students had to use mathematical formulas to calculate output based on velocity and average area of profile. From this data they had to predict the output and how it affects the creek.

How were students assessed?

Skip rated his students on the bases of collaboration, planning, and data accu-

racy. Each team submitted a written report and delivered an oral presentation. He also had his students submit reflective accounts of the experience.

Summary

This unit can be used by preservice teacher educators as a model of the types of lessons and technology integration being designed and developed by K-12 educators. College of Education faculty using NCREL materials can provide such model lessons as their students begin developing their own student teaching materials.

* NIH Image (<http://rsb.info.nih.gov/nih-image>) requires a color capable Macintosh and at least 4MB of available RAM. A free PC version of Image, called Scion Image for Windows, is available from Scion Corporation: <http://www.scioncorp.com/>

Available for Macintosh, Windows 95, and Windows NT

¹Part of NCREL's Captured Wisdom series

To find out more about this project, check out:

The Rivers Project
<http://www.siu.edu/OSME/river/index.html#RiversProject>

Coon Rapids High School Great Rivers Project
<http://www.cards.anoka.k12.mn.us/projects/grp/mrp.html>

Measuring the Creekbed is part of the NCREL/NCRTEC Captured Wisdom videotape and CD-ROM series. For more information, contact NCREL's order department at 800-356-2735.



Check Out These Web Sites

The following Web sites contain valuable information about technology and teacher education:

North Central Regional Technology in Education Consortium
www.ncrtec.org

This site provides a comprehensive look at technology integration in K-12 schools. It includes tips for teachers and resources for professional development and technology planning. For information about the Learning With Technology course, go to the Training and Professional Development section of this site.

NCATE News: Report Says Schools of Education Should Increase Emphasis on Technology
<http://www.ncate.org/specfoc/techrpt.html>

This report from The National Council for Accreditation of Teacher Education (NCATE) discusses technology's importance in defining accreditation standards for teacher candidates and the use of technology in schools of education.

Case Illustrations of Technology Use in Teacher Education
<http://www.ncate.org/projects/tech/Caseintr.html>

This site provides brief case illustrations that demonstrate innovative technology use in teacher education programs. These are based on NCATE's report, *Technology and the New Professional Teacher: Preparing for the 21st Century Classroom*.

Marcopolo
<http://www.wcom.com/marcopolo/>

Teaming with top educational organizations, Marcopolo has created standards-based Internet content for K-12 classrooms, and has provided online professional development resources to assist teachers in learning to integrate Internet-based resources.

Tell Us What You Think

We welcome your comments and suggestions for future issues of the newsletter. In particular, we are interested in information on technology integration, faculty profiles, K-12 classroom examples, technology and curriculum standards, and key issues in preservice teacher education.

Send your comments or suggestions to Debora Pitlik (dpitlik@ncrel.org) or Rhonda Robinson (rrobinson@niu.edu).

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TECHNOLOGY
AND
TEACHER
PREPARATION

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Fall 2000

IN THIS ISSUE

**Tools and Resources
for Systemic
Redesign**

**Critical Issue:
Providing
Professional
Development
for Effective
Technology Use**

**Promising Practices
Integrating
Information and
Communication
Technology Into
Teacher Education
Programs**

**Check Out These
Web Sites**

UIC Launches New Teacher Preparation Program

by Phil Vincent

While researchers continue to mull over the most effective way to prepare preservice teachers to use technology, faculty at the University of Illinois Chicago (UIC) have come to a rather intuitive conclusion—there is no replacement for real-life experience.

Last spring, a core group of UIC College of Education teacher candidates were placed in public schools throughout the Chicago area. As one would expect, they jumped into their practicum year, eager to get their first real taste of teaching in a big city public school. These, however, were not your typical teacher candidates. This group had received training on the integration and use of technology in the classroom through an innovative UIC/Chicago Public Schools pilot program. They were placed in schools identified as having above-average technology infrastructures and encouraged to weave technology appropriately throughout their lesson plans.

"We really have made the decision at UIC that the university is extremely committed to preparing teachers to use technology, and one of the most effective ways to do this is to have the candidates experience technology within their practicum year," said Dr. Louanne Smolin, assistant professor at UIC and one of a team of new hires the university recently recruited to infuse technology training throughout the College of Education.

The university relies upon its partnership with the Chicago Board of Education to identify schools that "use technology as a tool, not as an end unto itself," said Smolin. "CPS [Chicago Public Schools] tries to point us to classrooms with teachers that are either considered experts at integrating technology into their curriculum or have a genuine desire to do more with technology."

UIC places about 80 student teachers throughout Chicago area schools each year. How and when the student teachers use technology is typically left to the discretion of the lead teacher. According to Smolin, the university often encourages both candidates and teachers to find ways to use the Internet in the classroom. "We're really trying to help teachers and students use various electronic telecommunication tools to communicate with and connect to other classes and experts. We want to give both classroom and student teachers the opportunity to do things like work on projects with teachers in other countries.

"Other public schools have really gotten into very specialized technologies based upon different content areas," she added. "One school I was in yesterday had a music lab that had a MIDI synthesizer connected to a number of keyboards. The students all had the ability to learn how to compose and develop their musical abilities."

continued on page 2

NCREL
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"Applying Research and Technology to Learning"

continued from page 1

Yet, as technologies become more advanced and the uses more application specific, both universities and public schools face the problem of finding qualified, affordable support staff who can install, troubleshoot, and repair a variety of technologies. "For the most part," stressed Smolin, "once the student teachers plan something out and learn about the different ways that technology can be integrated into a curriculum, whether it be in a cooperative learning format or groupware type format—where a whole group of students might be interacting with one piece of software and doing some group activities around it...I think that they understand those structures. But, if there are problems in the school setting with loading different types of software or with computers that are freezing up, that's always a battle. The level of technical support the school has within the building is crucial. If that's not very fluid it makes it really hard for these students to do what they need to do. A support structure really helps."

A recent study released by the *Center for Research on Information Technology Organizations* reinforces Smolin's concerns, noting that two-thirds of American schools remain without a full-time technology coordinator. The study stresses the connection between the successful integration of technology into a school's curriculum and the availability of personnel who can provide everything from routine maintenance to individualized trainings.

While universities may have an easier time finding and funding technical support than public schools, both have inherently similar hurdles to leap. "For UIC it was a matter of

bringing everything together and making the infrastructure a little more user-friendly. We've done faculty workshops over the course of this last year and the college has committed itself to upgrading computers on a cyclical basis. We've also just renovated our computer laboratory so that it's more conducive to being not just a drop-in facility where students can complete assignments, but can also be used as a teaching and learning facility where faculty can come in and model different uses of technology within their own content domains," boasted a proud Smolin.

With the infrastructure in place and ongoing improvements in the works, starting in 2001 UIC College of Education students will be required to take a 1.5 credit technology course that supplements the information they receive in their individual methods courses. In other words, students preparing to become math teachers will be required to take a course on integrating technology into public school math curricula. These courses, combined with the experience they gain as student teachers in their practicum year, do more than simply expose the candidates to the possibilities various technologies present. What they learn is that using technology is not, as Smolin reminds us, "an end unto itself." The students are taught how and where to include technology and its relationship to a district's existing standards and assessment system. Most important, the students are taught that integrating technology is by no means simple.

"There's each of the content standards and also the Chicago standards that the students have to pay attention to as they're planning," notes Smolin. "We've also been using the NCATE [National Council for

Accreditation of Teacher Education] approved ISTE [International Society for Technology in Education] technology standards as we're developing our coursework. That's been a wonderful guide for us. What we try to teach the candidates is that you have an easier time with technology integration when you stop thinking in terms of content-specific types of software. It's better to look at applications that students can appropriate in a number of different ways. When you start with the standard, as opposed to the technology, it gets easier to integrate, and I think it takes a lot of the pressure off of how the students are feeling."

Not surprisingly, the courses offered through UIC's pilot program have gained in popularity as teacher candidates find themselves being asked about their experiences with technology in the classroom during job interviews for permanent positions in public schools. "They kind of really didn't believe it, but when they started going out on interviews and talking to principals and the principals were asking them about their technology experience, they realized how important it was to develop their ability to effectively integrate technology into the curriculum," laughed Smolin.

UIC intends to extend the program's planning team and will possibly seek additional funding through a PT3 grant. "Our goal is to move away from the stand-alone course model and really infuse technologies throughout the student experience," said Smolin. "We obviously have to do some of that through coursework, but we're really trying to look at it experientially and make it more dynamic throughout the life of our students while they're in our program."

Tools and Resources for Systemic Redesign

EnGauge: A Framework for Effective Technology Use in Schools

EnGauge is a new Web-based framework and tool set designed to help schools, districts, colleges, and universities use technology effectively for teaching and learning.

Developed by NCREL with the Metiri Group, enGauge provides a comprehensive view of critical factors in educational systems that strongly influence the effectiveness of educational technology.

The enGauge Web site will help educational stakeholders:

- See how the effective use of technology can advance student learning.
- Learn about the educational system conditions required to use technology effectively.
- Complete online assessments to gauge school or district progress with learning technology.
- Compare school or district technology profiles to national data.
- Develop an informed plan of action for learning technology based on this knowledge.
- Track and report progress to policymakers.

Each aspect of the enGauge model is designed to show how educational technology can promote high-performance learning, including the development of:

- Basic literacy competencies
- Higher-order thinking skills
- Real-world problem-solving abilities
- Intrinsic motivation
- Communication skills
- Collaboration skills

The enGauge Web site will be formally introduced in December 2000. For a sneak preview of this exceptional tool, visit <http://engauge.ncrel.org>. Contact info@ncrel.org to let us know what you think and how you can envision the expansion and effective use of enGauge.

Providing Professional Development for Effective Technology Use

Critical Issue:

The *Pathways to School Improvement* Internet server (<http://www.ncrel.org/pathways.htm>) helps education communities use research and stories from the shared experience of other educators to support sound decisions affecting the classroom, school, and learning community. By focusing on meaningful learning for all students, *Pathways* encourages improvement in leadership and professional development, math and science instruction, assessment, technology integration, parent involvement, school-to-work transition, early childhood education, drug-free schools, the education of "at risk" youth, and more.

A recent addition to *Pathways* is the *Critical Issue* document "Providing Professional Development for Effective Technology Use." This document discusses the need for professional development to help teachers effectively integrate digital and other interactive technologies into curriculum and learning environments. Professional development for meaningful technology integration should empower teachers to enhance student achievement, reinforce established curriculum goals and objectives, and provide both teachers and students with the ability to use powerful new tools to support teaching and learning. This new *Critical Issue*, which provides the latest research on technology professional development, is intended to help educators establish and implement professional development strategies that will have a positive impact on how technology is used and how students learn.

*Sneak
Preview*



ISSUE: Lack of professional development for technology use is one of the most serious obstacles to fully integrating technology into the curriculum (Fatemi, 1999; Office of Technology Assessment, 1995; Panel on Educational Technology, 1997). But traditional sit-and-get training sessions or one-time-only workshops have not been effective in making teachers comfortable with using technology or adept at integrating it into their lesson plans.

Instead, a well-planned, ongoing professional development program that is tied to the school's curriculum goals, designed with built-in evaluation, and sustained by adequate financial and staff support is essential if teachers are to use technology appropriately to promote learning for all students in the classroom.



OVERVIEW: The role of the classroom teacher is the crucial factor in the full development and use of technology in the

schools (Office of Technology Assessment, 1995; Trotter, 1999). Yet, many teachers do not have the technical knowledge or skills to recognize the potential for technology in teaching and learning. Just knowing how to use a computer is not enough. Instead, teachers must become knowledgeable about technology and self-confident enough to integrate it effectively in the classroom.

To reach the goal of preparing teachers for effective technology use, a well-designed professional development program is essential. Professional development in a technological age requires new definitions and new resources. It cannot take the traditional forms of individual workshops or one-time training sessions. Instead, it must be viewed as an ongoing part of teachers' professional lives. Two requirements help ensure the success of professional development for effective technology use.

First, professional development for technology use should be an integral part of the school technology plan or an overall school-improvement plan, not just an add-on. Initial inclusion in the technology plan ensures that professional development is consid-

ered an essential factor in using technology to improve teaching and learning.

Second, professional development for technology use should contain essential components that research has found to be important. These components include the following: a connection to student learning, hands-on technology use, a variety of learning experiences, curriculum-specific applications, new roles for teachers,

collegial learning, active participation of teachers, ongoing process, sufficient time, technical assistance and support, administrative support, adequate resources, continuous funding, and built-in evaluation.

www.ncrel.org/sdrs/areas/issues/methods/technlgy/te1000.htm

Coming in 2001...

Integrating Technology Into Literacy Instruction

Critical Issue

The advent of computer technologies will inevitably change the way we understand what it means to be a literate person in the 21st century. Just as the Gutenberg press augmented the currency of communication and information from an immediately shared oral-based mode of exchange to include a time-transcendent text-based mode "of exchange, so will the advent of digital technologies augment the exchange of communication to include even richer representations of communication, allowing greater flexibility in "hearing" and "reading" the messages.

While these changes in the possibilities of communication afford us with new ways to understand and make use of the world around us, they have been embraced with as much enthusiasm as they have been held with suspicion. Stepping outside of this value-laden drama, educators instead need unbiased recourse to current research, succinct information, and innovative yet sound practices regarding the potential efficacy these technologies might have via a literacy education. This upcoming *Critical Issue* document, which provides the latest research on technology and literacy, is intended to help educators establish and implement reading comprehension strategies that incorporate the use of technology and have a positive impact on how students learn to read.

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85 10

Promising Practices: Integrating Information and Communication Technologies Into Teacher Education Programs

By Richard B. Bryant, Jr.
Program Associate, NCRTEC

 Our challenge and our charge are to see to it that all teachers have the capacity to effectively and appropriately use technology in the classroom. Many schools and colleges of education are making strides in integrating information and communication technologies throughout their teacher preservice programs. Three examples of these promising innovations in teacher preservice programs are provided below. Two are from programs within the U.S. and one is from the Netherlands.

A Leap for the Future in Teacher Education in the Netherlands

The Dutch government established the Committee on Multimedia in Teacher Training (COMMITT) to consider the process of learning in the future and how teacher training must change to embrace the central role of information and communication technologies (ICT). COMMITT concluded that technology's potential will only be realized when the roles of teachers and students are changed. Accordingly, higher education in the Netherlands was challenged to create sustainable models for teacher training that would support movement "out of the box," a paradigm shift for teacher preservice education.

This program of planned transformation was labeled "A Leap for the Future." It focuses on serving the current needs of education while developing the human capital to serve the needs for the future. The new model focuses on independence, flexibility, individualization, and customization by fully integrating information and communication technologies into the

curriculum. This integration allows for "anytime/anyplace" learning by the student teachers, providing them with the ability to escape the typical "school-as-a-building" philosophy.

Through COMMITT, the Dutch government held a competition for universities and schools of education to design and, ultimately, implement new models for educating future teachers. The two winning institutions were the Ichthus University of Professional Education and the University of Twente. Ichthus dubbed its innovative and experimental program, Explo. The following characteristics centering on uses of Information Technologies (IT) are some of the features that clearly set the Explo program apart from the norm in teacher education and distinguish it as a promising program. IT serves as:

1. A link between learning-as-you-work in practice and learning-as-you-work during coursework (the Internet).
2. An aid in providing adaptive education in elementary schools in a multicultural and international context (multimedia software, the Internet).
3. A means for students to develop vision and skill in the use of IT in education: "being digital" (a laptop as a mobile toolbox for daily use).
4. An impetus for lecturers and students to be innovative colleagues in designing learning environments (digital).
5. A hub for exchanging knowledge (Web site, electronic discussion platform) and for maintaining the organization's external contacts (e-mail).

The goal of the Ichthus faculty through Explo is to train teachers who:

- Learn as they work and are innovative.
- Function in a multicultural and international environment.
- Use information technologies with vision and skill.

Project KITES (Kids Interacting with Technology and Education Students)

Using Technology to Provide Authentic Learning Experiences for Teachers

Another promising program in preservice teacher education exists through a collaborative initiative of the College of Education and the University Lab School at Louisiana State University. Project KITES (Kids Interacting with Technology and Education Students) provides preservice teachers with an opportunity to integrate technology throughout their student-teaching experience.

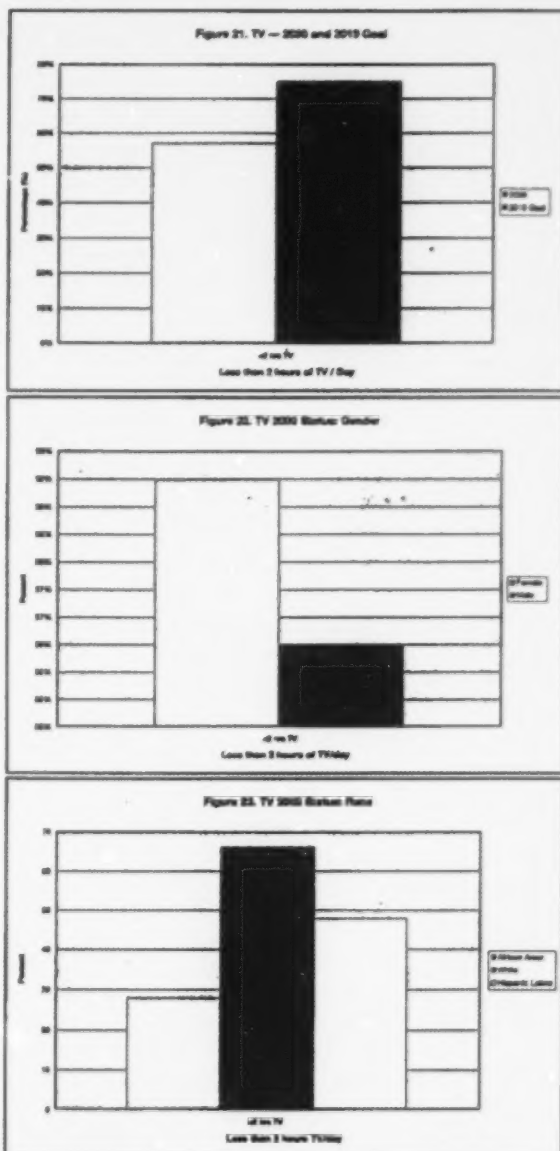
Project KITES integrates the learning and practicing of technology skills into real-world teaching contexts. Though the preservice teachers enrolled in this project were taking their first professional education course and had not yet taken the required technology course, they emerged with a deep awareness of and comfort level with integrating technology into real learning experiences.

Each preservice teacher is paired with a fourth grader at the University Lab School to work on technology-based projects in the language arts area. KITES activities, such as Fourth Grade Friends, engage students in a variety of technology-based learning applications. Students create individual newsletters to introduce themselves, a friend from another

Target setting method: Better than the best.

Data source: Youth Risk Behavior Surveillance System (YRBSS), CDC, NCCDPHP.

FIGURES 21-23 SUMMARIZE THE 2000 STATUS AND 2010 GOALS FOR WATCHING LESS TV, RELATED TO GENDER AND RACE.



The health benefits of moderate and vigorous physical activity are not limited to adults. Physical activity among children and adolescents is important because of the related health benefits (cardiorespiratory function, blood

pressure control, and weight management) and because a physically active lifestyle adopted early in life may continue into adulthood. Even among children aged 3 to 4 years, those who were less active tended to remain less active after age 3 years than most of their peers.²⁴ These findings highlight the need for parents, educators, and health care providers to become positive role models and to be involved actively in the promotion of physical activity and fitness in children and adolescents.

Many children are less physically active than recommended, and physical activity declines during adolescence.^{25, 26} One study found that one-quarter of U.S. children spend 4 hours or more watching television daily.²⁷ Schools are an efficient vehicle for providing physical activity and fitness instruction because they reach most children and adolescents. Participation in school physical education ensures a minimum amount of physical activity and provides a forum to teach physical activity strategies and activities that can be continued into adulthood. Findings suggest that the quantity and, in particular, the quality of school physical education programs have a significant positive effect on the health-related fitness of children and adolescents by increasing their participation in moderate to vigorous activities.^{28, 29}

Studies have shown that spending 50 percent of physical education class time on physical activity is an ambitious but feasible target. Being active for at least half of physical education class time on at least half of the school days would provide a substantial portion of the physical activity time recommended for adolescents.³⁰ To achieve the benefits of school-based physical education equitably for all children, daily adaptive physical education programs should be available for children with special needs. School physical education requirements also are recommended for students in preschool and postsecondary programs.³¹

Physical education is the primary source of physical activity and fitness instruction. Health education and other courses, however, can highlight the importance of physical activity as a component of a healthy lifestyle. A well-designed health education curriculum can help students develop the knowledge, attitudes, behavioral skills, and confidence needed to adopt and maintain physically active lifestyles.³¹ To maximize classroom time, instruction on physical activity also can be integrated into the lesson plans of other school subjects, such as mathematics, biology, and language arts. Programs that have included classroom instruction in physical activity have been effective in enhancing students' physical activity-related knowledge,³² attitudes,³³

behavior,³⁴ and physical fitness.³⁵ (See Focus Area 7. Educational and Community-Based Programs.)

Access

- 22-12. (Developmental) Increase the proportion of the Nation's public and private schools that provide access to their physical activity spaces and facilities for all persons outside of normal school hours (that is, before and after the school day, on weekends, and during summer and other vacations).

Potential data source: School Health Policies and Programs Study (SHPPS), CDC, NCCDPHP.

- 22-13. Increase the proportion of worksites offering employer-sponsored physical activity and fitness programs.

Target: 75 percent.

Baseline: 46 percent of worksites with 50 or more employees offered physical activity and/or fitness programs at the worksite or through their health plans in 1998-1999.

Worksite Size (# of employees)	Worksite or Health Plan	Health Plan Percent	Worksite
Total 50 or more	46	22	36
50 to 99	38	21	24
100 to 249	42	20*	31
250 to 749	56	25	44
750 or more	68	27	61

Less than 50 Developmental

Target setting method: Better than the best.

Data source: National Worksite Health Promotion Survey, Association for Worksite Health Promotion (AWHP).

Participation in regular physical activity depends, in part, on the availability and proximity of community facilities and on environments conducive to physical activity. Studies of adult participation in physical activity have found that use generally decreases as facility distance from a person's residence increases.³⁶ People are unlikely to use community resources located more than a few miles away by car or more than a few minutes away by biking or walking.

One of the major barriers to youth participation in sports is lack of enough sports facilities.³⁷ Increased access to community physical activity facilities would, therefore, help increase youth physical activity. The availability of

school facilities for physical activity programs also may be beneficial for crime and violence prevention and other social programs,³⁷ because most juvenile crime is committed between 3 and 8 p.m.

Schools need to work with community coalitions and community-based physical activity programs to take maximum advantage of school facilities for the benefit of children and adolescents and the community as a whole. The needs of all community members, including senior citizens and people with disabilities, need to be considered.

Worksite physical activity and fitness programs provide a mechanism for reaching large numbers of adults and have at least short-term effectiveness in increasing the physical activity and fitness of program participants.³⁸ Such programs should be provided in a culturally and linguistically competent manner. Evidence that worksite programs are cost-effective is growing. Such programs may even reduce employer costs for insurance premiums, disability benefits, and medical expenses.³⁹ Additional benefits for employers include increased productivity, reduced absenteeism, reduced employee turnover, improved morale, enhanced company image, and enhanced recruitment. Including family members and retirees in worksite programs can further increase benefits to employers and the community.³⁹

As purchasers of group health and life insurance plans, employers can design employee benefit packages that include coverage for fitness club membership fees and community-based fitness classes. Employers also can offer reduced insurance premiums and rebates for employees who participate regularly in worksite fitness programs or who can document participation in regular physical activity.

- 22-14. Increase the proportion of trips made by walking.

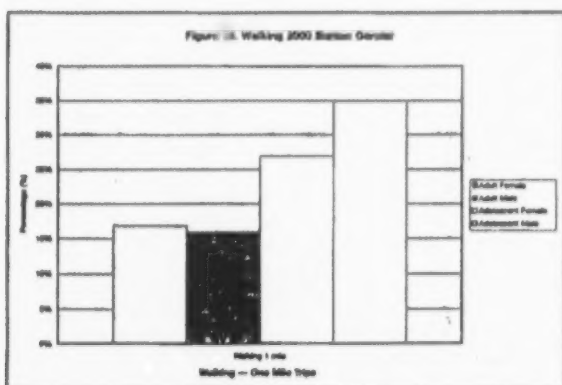
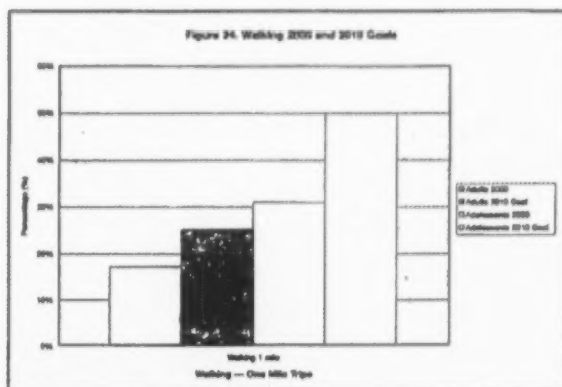
Target and baseline:

Objective	Increase in Trips Made by Walking	Length of Trip	1995 Baseline*	2010 Target Percent
22-14a. Adults aged 18 years and older		Trips of 1 mile or less	17	25
22-14b. Children and adolescents aged 5 to 15 years		Trips to school of 1 mile or less	31	50

Target setting method: 47 percent improvement for 22-14a and 68 percent improvement for 22-14b. (Better than the best will be used when data are available.)

Data source: Nationwide Personal Transportation Survey (NPTS), DOT.

FIGURES 24 AND 25 SUMMARIZE THE 1990 AND 2000 STATUS AND THE 2010 GOALS FOR WALKING FOR ADULTS AND ADOLESCENTS RELATED TO GENDER.



Walking is a very popular form of physical activity in the United States; however, people need the opportunity to walk safely. Over 75 percent of all trips less than 1 mile were made by automobile in 1995.⁴⁰ In addition, the number of walking trips as a percentage of all trips taken (of any distance) has declined over the years. Walking trips made by adults dropped from 9.3 percent in 1977 to 7.2 percent in 1990 and again to 5.4 percent in 1995. Walking has declined even more sharply for children.⁴⁰ These declines have negative implications for the health of adults and children.

22-15. Increase the proportion of trips made by bicycling.

Target and baseline:

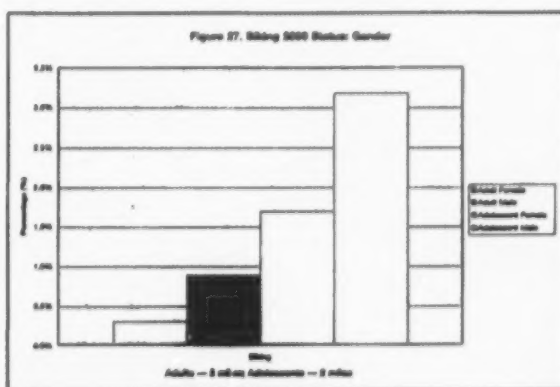
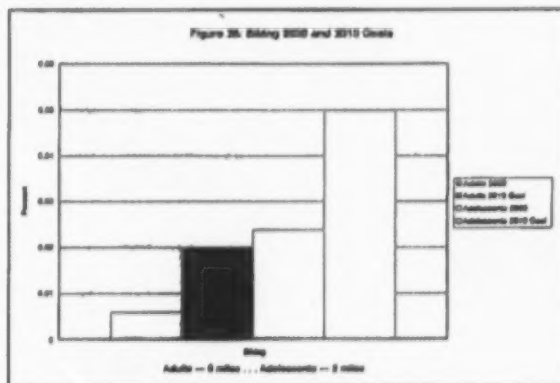
Objective	Increase in Trips Made by Bicycling	Activity	1995 Baseline*	2010 Target Percent
22-15a.	Adults aged 18 years and older	Trips of 5 miles or less	0.6	2.0
22-15b.	Children and adolescents aged 5 to 15 years	Trips to school of 2 miles or less	2.4	5.00

*Age adjusted to the year 2000 standard population.

Target setting method: 233 percent improvement for 22-15a and 108 percent improvement for 22-15b. (Better than the best will be used when data are available.)

Data source: Nationwide Personal Transportation Survey (NPTS), DOT.

FIGURES 26-27 SUMMARIZE THE 1990 AND 2000 STATUS AND THE 2010 GOALS FOR BICYCLING RELATED TO GENDER.



Bicycling is another form of transportation that may be used by both children and adults for distances that may not be feasible, practical, or efficient to cover by walking. If the environment does not provide safe opportunities for physical activities such as walking and bicycling, adults and children likely will spend more time engaging in sedentary activities indoors. (See Focus Area 8. Environmental Health.) Sedentary activities such as watching television, playing video games, and using personal computers have contributed to increases in the cases of overweight individuals.²⁷

Summary

The Department of Health and Human Services, working with other governmental agencies, professional groups, and individuals, have identified general areas of concern for the nation's health. Specific health needs have been described for each of the focus areas, with trends over the past several years presented and targets determined for the next decade. Physical activity and fitness has been an important priority area that now recommends a variety of types and intensities of physical activity for all individuals.

Terminology

Aerobic: Conditions or processes that occur in the presence of, or requiring, oxygen.⁴¹

Energy expenditure: The energy cost to the body of physical activity, usually measured in kilocalories.⁴¹

Functional independence: The ability to perform successfully and safely activities related to a daily routine with sufficient energy, strength/endurance, flexibility, and coordination.

Physical activity: Bodily movement that is produced by the contraction of skeletal muscle and that substantially increases energy expenditure.¹

Moderate physical activity: Activities that use large muscle groups and are at least equivalent to brisk walking. In addition to walking, activities may include swimming, cycling, dancing, gardening and yardwork, and various domestic and occupational activities.

Vigorous physical activity: Rhythmic, repetitive physical activities that use large muscle groups at 70 percent or more of maximum heart rate for age. An exercise heart rate of 70 percent of maximum heart rate for age is about

60 percent of maximal cardiorespiratory capacity and is sufficient for cardiorespiratory conditioning. Maximum heart rate equals roughly 220 beats per minute minus age. Examples of vigorous physical activities include jogging/running, lap swimming, cycling, aerobic dancing, skating, rowing, jumping rope, cross-country skiing, hiking/backpacking, racquet sports, and competitive group sports (for example, soccer and basketball).

Physical fitness: A set of attributes that persons have or achieve that relates to the ability to perform physical activity.¹ Performance-related components of fitness include agility, balance, coordination, power, and speed.⁴² Health-related components of physical fitness include body composition, cardiorespiratory function, flexibility, and muscular strength/endurance.⁴¹

Agility: Ability to start, stop, and move the body quickly and in different directions.

Balance: Ability to maintain a certain posture or to move without falling.

Body composition: The relative amount of body weight that is fat and nonfat.

Cardiorespiratory function: A health-related component of physical fitness that relates to the ability of the circulatory and respiratory systems to supply oxygen during physical activity.

Coordination: Ability to do a task integrating movements of the body and different parts of the body.

Exercise (exercise training): Planned, structured, and repetitive bodily movement done to improve or maintain one or more components of physical fitness.

Flexibility: Ability to move a joint through the full range of motion without discomfort or pain.

Muscular endurance: Ability of the muscle to perform repetitive contractions over a prolonged period of time.

Muscular strength: Ability of the muscle to generate the maximum amount of force.

Power: Ability to exert muscular strength quickly.

Speed: Ability to move the whole body quickly.

Sedentary: Denotes a person who is relatively inactive and has a lifestyle characterized by a lot of sitting.⁴¹

Physical Activity and Fitness Quote



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tives required to use technologies effectively today, as well as the ability to learn more as technologies change and new opportunities arise. Such certification will increase student satisfaction and confidence. It also will be a powerful recruiting device.

Technologies have a great deal to offer to education. It's important to ensure that teachers understand how technologies can serve both their students and themselves. Teaching this lesson takes a lot of work, but nothing could be more important in effectively preparing teachers for the future.

Noteworthy: The InTime Model

If technology is indeed a facilitator of quality education, how will it be used? How can developments in information technology facilitate a new paradigm for education appropriate for the 21st century while enhancing student achievement in core areas deemed important to our democratic society? The InTime model, being developed at the University of Northern Iowa in Cedar Falls, may hold some of the answers. It includes five major dimensions:

1. Students at the center of their own learning
2. Principles of good learning
3. Aspects of information processing
4. Standards from content disciplines
5. Tenets of effective citizenship in a democratic society

With the students at the center of their own learning and with principles of good learning as a constant, a learning activity could use any of the components of the model as the departure point for instruction. For example, the development of a particular information-processing skill could be the focal point for instruction, with democratic principles and content standards being seen as a subset of that learning activity. The power of the learning model is, of course, when the various components of the model are brought into alignment so that the learning experience is achieving multiple objectives.

InTime provides a framework for thinking more holistically about the educational process. It incorporates the best of what we know about learning with activities designed to develop the dispositions and skills students need to process the massive flow of information available to them. It provides for rich and appropriate content as defined by the disciplines themselves, and it organizes learning experiences and student activities to promote effective citizenship in a democratic society. Technology is brought to bear on the components of the model as an essential mechanism to achieve the larger goals of our educational system.

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North Central Regional Educational Laboratory (NCREL) is one of ten federally funded regional educational laboratories serving the needs of students and educators across the United States. NCREL specializes in technology integration and serves the upper-midwestern region of the country.

For over 10 years, NCREL has developed and delivered products and services for K-12 educators. For example, our *Pathways to School Improvement Web* site (www.ncrel.org/pathways.htm) receives over 1,200 visitors daily and our *Learning With Technology* course helps practicing teachers integrate technology into the curriculum in meaningful ways. We invite you to visit our Web site (www.ncrel.org) for more information on these and many other resources.

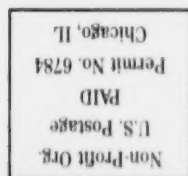
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Over the years, many preservice teacher educators have expressed interest in our efforts to help classroom teachers develop strategies for integrating technology into the curriculum. Spurred by this interest, NCREL has created a project called *Preparing Teachers for Tomorrow* (PTT). The project's goal is to support education

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